



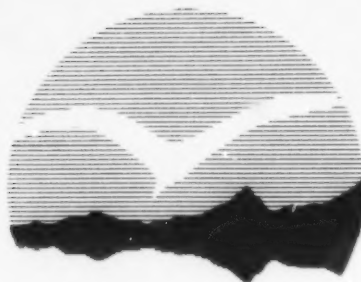
**Environment
Canada**

Conservation and
Protection

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Canada**

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**WATER
RESOURCES
BRANCH
SASKATCHEWAN DISTRICT**

SPRUCE RIVER DIVERSION PROJECT

1990 ANNUAL REPORT

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Inland Waters Directorate

Water Resources Branch

October 1991

TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION	1
2.0 BACKGROUND	2
3.0 1990 OPERATION	6

MAP

Spruce River Diversion Project	8
--------------------------------------	---

APPENDICES

APPENDIX I - THE AGREEMENT	9
APPENDIX II - 1990 DATA	17

Daily Water Levels or Discharges

Anglin Lake Reservoir	18
Spruce River Diversion to Emma Lake	19
Emma Lake Near Tweedsmuir	20
Christopher Lake near Christopher Lake	21

Hydrographs

Anglin Lake Reservoir	22
Spruce River Diversion to Emma Lake	23
Emma Lake near Tweedsmuir	24
Christopher Lake near Christopher Lake	25

On December 7, 1960 an agreement was signed between the Government of Canada and the Government of Saskatchewan covering the construction and operation of a dam on the outlet of Anglin Lake and a pumping plant to divert water from Anglin Lake to Emma and Christopher lakes. Anglin Lake is partially located within Prince Albert National Park thus necessitating an agreement between the two levels of government. Emma and Christopher lakes are extensively utilized for recreational purposes. Environment Canada, Water Survey of Canada, (Water Resources Branch) has been responsible for monitoring the Agreement since operation of the project began in 1961.

This report provides background information leading to the development of the project, outlines the operation of the project during 1990, with particular reference to the water levels and riparian releases specified in the Agreement, and contains a copy of the Agreement and documentation of the subsequent amendments.

Emma and Christopher lakes are located approximately 50 km north of Prince Albert, Saskatchewan as shown on the location map on page 8.

The water level of these two lakes and other smaller lakes in the vicinity, began to recede in the mid-1930s for no apparent reason. The declining water levels severely decimated the muskrat population in the area and reduced the recreational potential of Emma and Christopher lakes. In the late 1940s a proposal was made to divert water from Anglin Lake through Kewpie, Nora and Joesie lakes to Emma Lake in order to restore the water levels. However, hydrologic investigations indicated that the only feasible method of restoring the lake levels was to pump the excess annual flow from the Spruce River over a low rise into Gladys Lake where the water would then flow by gravity into Emma Lake via Blanche and Mae lakes.

The project proposal consisted of the construction of a dam on the outlet of Anglin Lake to store excess waters as well as construction of a pumping plant and diversion drawing water directly from the lake. Anglin Lake is partially located within Prince Albert National Park necessitating an agreement between the two levels of government. On December 7, 1960 an Agreement was signed between the Government of Canada and the Government of Saskatchewan covering the construction and maintenance of the diversion works and the operational procedure. The necessary works were constructed by Saskatchewan and operational procedures are governed by the Agreement itself.

In general, the operational procedures specified in the Agreement are as follows:

1. From the first day of April to the thirty-first day of October in each year, Saskatchewan will maintain a downstream flow of a least 0.142 cubic metres per second (5 cubic feet per second) in the Spruce River below Anglin Lake Reservoir;
2. Saskatchewan will not at any time divert water from Anglin Lake if the water elevation is below 514.56 m (1688.2 feet), Geodetic Survey of Canada (GSC) datum;
3. Saskatchewan will at all times maintain Anglin Lake at an elevation not exceeding 515.26 m (1690.5 feet), GSC datum.

In 1962 the Agreement was amended to increase the maximum elevation of Anglin Lake from 515.26 m (1690.5 feet) to 515.42 m (1691.0 feet), GSC datum.

The Agreement and the correspondence documenting the amendment to the original Agreement are contained in Appendix I. It should be noted that the Anglin Lake elevations given in the original Agreement are referenced to Saskatchewan Department of Agriculture datum although this is not stated in the Agreement. In 1968 all elevations were referenced to Geodetic Survey of Canada datum to standardize the maintenance of water levels. The Anglin Lake elevations given in the Agreement can be converted to GSC datum by adding 30.39 m (99.7 feet).

The maximum and minimum elevations for Emma and Christopher lakes were not specified in the Agreement but the Province of Saskatchewan has set the full supply level (FSL) for Emma Lake and Christopher Lake at 515.42 m (1691.0 feet) and 514.65 m (1688.5 feet) GSC datum, respectively. Water is diverted from Anglin Lake Reservoir, within the terms of the Agreement, to maintain these levels.

A 1970s provincial study on water levels on Emma and Christopher Lakes concluded that to improve the operation of the lakes a range in which water levels would be allowed to fluctuate, rather than a fixed full supply level, would be established. The desirable water levels for the lakes are:

1. Emma Lake 515.42 m to 515.57 m
2. Christopher Lake 514.65 m to 514.80 m.

Environment Canada, Water Resources Branch, has been responsible for monitoring the Agreement since operation of the project began in 1961. Monthly operational reports were prepared during the April to October period and deviations from the specified operational procedure brought to the attention of the Province of Saskatchewan.

In 1974, the practice of issuing monthly reports was examined with the conclusion that the reports should be replaced by an annual report and breaches in the Agreement would be drawn to the attention of the Saskatchewan Department of the Environment (now the Saskatchewan Water Corporation) on an ongoing basis.

The operational procedures of Anglin Lake, as specified in the Agreement, are monitored by means of recording water level gauges on Anglin Lake and on the Spruce River below Anglin Lake. In the fall of 1973 a corrugated sheet metal weir was installed downstream of the gauge on the Spruce River for the accurate determination of the outflow from Anglin Lake. This weir was replaced by a sheet piling one in 1981. Prior to 1975 manual water level gauges were operated by Water Resources Branch, at the request of the Province of Saskatchewan, on Emma Lake and Christopher Lake. In 1975 the operation of these two gauges was taken over by Saskatchewan Environment (now Saskatchewan Water Corporation) but the data continues to be published by Water Resources Branch.

The gauging stations shown on the map (page 8) are as follows:

<u>Station Number</u>	<u>Station Name</u>
05GG005	Anglin Lake Reservoir
05GG006	Spruce River Diversion to Emma Lake
05GG007	Spruce River below Anglin Lake Reservoir
05GG008	Emma Lake near Tweedsmuir
05GG009	Christopher Lake near Christopher Lake

In 1985 an ad hoc committee was established to monitor and advise on Anglin Lake Reservoir operations as it relates to pumping into and the operations of Emma and Christopher Lakes.

The mean water level for 1990 for Anglin Lake Reservoir was 515.384 m. The reservoir exceeded the specified maximum water level of 515.420 m for one period of 127 days (April 5 to August 10). The maximum recorded daily water level of 515.612 m occurred on May 16 thus exceeding the specified maximum water level by 0.192 m. Releases from the reservoir during the period exceeding the specified maximum water level were not computed.

The daily discharges of the Spruce River below Anglin Lake Reservoir were not computed for 1990. Water Survey of Canada field technologists were unable to measure the released discharges due to a large stable beaver dam on the control and intense beaver activity downstream of the gauge. Spruce River below Anglin Lake Reservoir remained a live stream for the entire year.

There was some leakage through the stop logs when the riparian outlet was closed by the Department of Parks, Recreation and Culture staff.

Emma Lake water levels were in the desirable range of 515.42 m to 515.57 m from early June to late June and July 1 to September 11. There were only eight water levels published for the period May 8 to June 26. The daily mean water level for the period June 27 to September 26 was 515.429 m.

Christopher Lake water levels were in the desirable range of 514.65 m to 514.80 m from approximately June 25 to August 14. During the remainder of the year the water levels were below the desirable range. A mean water level was not available for 1990 due to the limited data available.

The total diversion from Anglin Lake Reservoir to Emma Lake was 5890 dam³ during the period May 3 to September 10. The level of Anglin Lake Reservoir was above the minimum level specified in the agreement during the diversion.

Data for Spruce River below Anglin Lake Reservoir was not computed for 1990. Water level and discharge data for the other four stations in the Spruce River Project are included in Appendix II.

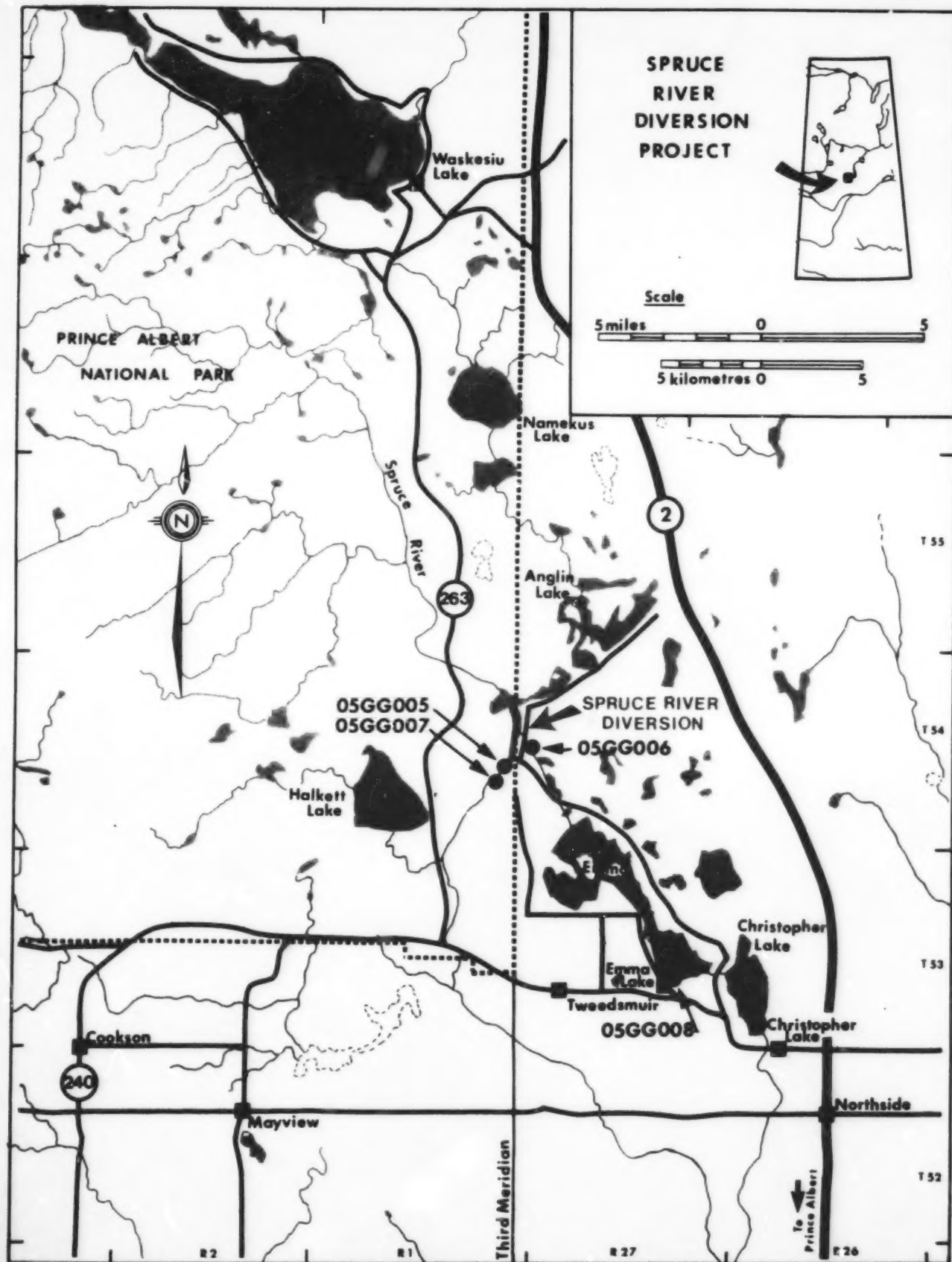
SPRUCE RIVER DIVERSION PROJECT



Scale

5 miles 0 5

5 kilometres 0 5



APPENDIX I

"COPY"

THIS AGREEMENT MADE THIS 7th day
December , 1960,
BETWEEN:

THE GOVERNMENT OF CANADA,
hereinafter called "Canada",

OF THE FIRST PART

AND

THE GOVERNMENT OF THE PROVINCE
OF SASKATCHEWAN, hereinafter
called "Saskatchewan",

OF THE SECOND PART

WHEREAS the water levels of Emma Lake in the Province of
Saskatchewan have decreased progressively for many years;

WHEREAS Saskatchewan has decided to divert waters from Anglin Lake
to Emma Lake in an effort to resotre the levels of Emma Lake;

WHEREAS Saskatchewan desires to achieve this by having constructed on
the Spruce River within Prince Albert National Park, hereinafter called the Park, a dam,
spillway and control structure necessary in the diversion of such waters; and

WHEREAS the regulation of the Spruce River will benefit the Park and
the Little Red Indian Reserve to the south of the Park during the summer
months;

NOW THEREFORE THIS AGREEMENT WITNESSETH that, in
consideration of the covenants and agreements herein contained, the parties covenant
and agree each with the other as follows:

1. Canada will construct a dam, spillway and control structure including a
bridge across the said dam, at Site 1 on Spruce River in Prince Albert
National Park as shown on the attached plan no. R4566, prepared by the
Engineering Branch of the Department of Agriculture of the Government
of Canada on the 6th day of January, 1959.
2. (1) Canada will bear the cost of clearing land within the Park that may be
covered by water consequent upon completion of the said dam.
(2) Saskatchewan will zone and cause to be developed in accordance with
sound Park practices as determined by the Minister of Natural Resources
of the Province of Saskatchewan the provincial area abutting on Anglin
and Namekus Lakes within one half mile of the Park boundary.

3. Saskatchewan will acquire and clear all land outside the Park that may be covered by water consequent upon the completion of the said dam and appurtenances.
4. Saskatchewan will raise the provincial road outside the Park as far as the flooding may make it necessary.
5. On the completion of the said dam and appurtenances, Saskatchewan will operate, maintain and keep them in good repair.
6. So long as Saskatchewan is not negligent and complies with the terms of this agreement, Saskatchewan will only be liable for ordinary and reasonable costs incurred for the operation, maintenance and repair of the said dam and appurtenances.
7. During the period commencing the first day of April and ending the thirty-first day of October in each year, Saskatchewan will maintain a downstream flow of at least five cubic feet per second below the said dam into the said Spruce River, but Saskatchewan will at all times maintain Anglin Lake at a level of not exceeding 1590.8 unless the Director of the Water Resources Branch of the Department of Northern Affairs and National Resources of the Government of Canada and the Chief Engineer, Water Rights Division, Conservation and Development Branch, of the Department of Agriculture of Saskatchewan, otherwise agree and Saskatchewan will not at any time divert water from Anglin Lake, if it is below elevation 1588.5.
8. Subject to this agreement Saskatchewan may store and use water, if any, impounded by the said dam for replenishing the water levels in Emma and Christopher Lakes outside the Park.
9. Saskatchewan will prevent the said water from being used by persons, other than residents near Emma Lake, for purposes other than swimming, boating and fishing.
10. Saskatchewan will at all times indemnify and save harmless Canada from and against all claims, demands, loss, costs, damages, actions, suits or other proceedings by whomsoever made, sustained, brought or prosecuted, in any manner based upon, occasioned by or attributable to, anything done or omitted by Saskatchewan in fulfilment of this agreement.

11. Canada will at all times indemnify and save harmless Saskatchewan from and against all claims, demands, loss, costs, damages, actions, suits or other proceedings by whomsoever made, sustained, brought or prosecuted, in any manner based upon, occasioned by or attributable to, anything done or omitted by Canada in fulfilment of this agreement or based upon, occasioned by or attributable to the building of a dam and appurtenances or any weakness or failure of the said dam.
12. This agreement will be in force for thirty-five years and thereafter it will continue in force unless it is cancelled by either party on giving sixty days' notice in writing to the other party.

IN WITNESS WHEREOF the Minister of Northern Affairs and National Resources on behalf of the Government of Canada and the Minister of Natural Resources on behalf of the Government of the Province of Saskatchewan have set hereunto their hands and seals.

SIGNED, SEALED AND DELIVERED
by the Honourable Walter Dinsdale
on behalf of the Government of
Canada in the presence of

A.B. Miller _____ (Signed W. Dinsdale (seal))
Honourable Water Dinsdale

and by the Honourable A.G. Kuziak
on behalf of the Government of
Saskatchewan in the presence of

C.E. Fletcher _____ (Signed A.G. Kuziak (seal))
Honourable A.G. Kuziak

"COPY"

OTTAWA, October 19, 1962

The Honourable A.G. Kuziak,
Minister of Natural Resources,
Saskatchewan Government Administration Building,
REGINA, Saskatchewan

Dear Mr. Kuziak:

I refer to your letter of the 2nd of October 1962 requesting changes in the Agreement between Canada and Saskatchewan in connection with the Spruce River diversion to Emma Lake.

After careful consideration of the situation, I agree that the maximum elevation of Anglin Lake may be increased from 1590.8 as specified in the Agreement, to 1591.3, an increase of six inches. There will be no accompanying change in the elevation (1588.5) below which diversion from the lake is not allowed. We enquired of the Prairie Farm Rehabilitation Administration what effect this proposed increase in the upper elevation would have on the dam and have been informed by them that there will be no adverse effect on the structure provided that the annual operation procedure of withdrawing all stop-logs prior to flood periods is maintained. In agreeing to the increase, it is on condition that this operation procedure is continued.

With regard to your second request, for a change in the minimum flow required in the Spruce River and the period during which this minimum flow is required, I cannot agree to a change in this requirement on the basis of only two years of operation, particularly when one of those years produced such a very low runoff. One of the main purposes of the dam, as far as the federal government is concerned, is to ensure this minimum summer flow.

.....2

In summary, I agree that Section 7 of the Agreement which we signed on the 7th of December 1960 may be changed to read as follows:

"7. During the period commencing the first day of April and ending the thirty-first day of October in each year, Saskatchewan will maintain a downstream flow of a least five cubic feet per second below the said dam into the said Spruce River, but Saskatchewan will at all times maintain Anglin Lake at a level of not exceeding 1591.3 unless the Director of the Water Resources Branch of the Department of Northern Affairs and National Resources of the Government of Canada and the Chief Engineer, Water Rights Division, Conservation and Development Branch, of the Department of Agriculture of Saskatchewan otherwise agree and Saskatchewan will not at any time divert water from Anglin Lake, it is below elevation 1588.6."

Yours sincerely

Walter Dinsdale.

- c.c. Director,
National Parks Branch
- c.c. Hon. Alvin Hamilton,
Minister of Agriculture.
- c.c. The Right Honourable John G. Diefenbaker,
P.C., Q.C., M.P.

"COPY"

Minister of Natural Resources

Government Administration Bldg.,
Regina, Saskatchewan,
November 2, 1962

Honourable Walter Dinsdale,
Minister of Northern Affairs
and National Resources,
Ottawa, Canada.

Dear Mr. Dinsdale:

Your letter of October 19, 1962 has been considered by my staff, and my understanding is that Section 7 of the Agreement signed on December 7, 1960 may now be changed to read as follows:

"7. During the period commencing the first day of April and ending the thirty-first day of October in each year, Saskatchewan will maintain a downstream flow of at least five cubic feet per second below the said dam into the said Spruce River, but Saskatchewan will at all times maintain Anglin Lake at a level of not exceeding 1591.3 unless the Director of the Water Resources Branch of the Department of Northern Affairs and National Resources of the Government of Canada and the Chief Engineer, Water Rights Division, Conservation and Development Branch, of the Department of Agriculture of Saskatchewan otherwise agree and Saskatchewan will not at any time divert water from Anglin Lake, if it is below elevation 1588.5."

It is further understood that you cannot agree, at the present time, to a change in the minimum flow in the Spruce River. The annual operating procedure of withdrawing all stop-logs prior to flood periods will be maintained for the protection of the structure.

May your letter of October 19, 1962 and this letter constitute sufficient documentation of our understanding of the amendment to the original agreement?

Yours very truly,

A.G. Kuziak.

"COPY"

OTTAWA, November 16, 1962.

The Honourable A.G. Kuziak,
Minister of Natural Resources,
Government Administration Building,
REGINA, Saskatchewan.

Dear Mr. Kuziak:

Thank you for your letter of the 2nd of November 1962 confirming your understanding of the change in Section 7 of our Agreement concerning the Spruce River Dam.

I feel that my letter of the 19th of October 1962 and your letter of the 2nd of November 1962 can be considered as sufficient documentation of this amendment to our original Agreement, signed on the 7th of December 1960.

Yours sincerely,

Walter Dinsdale

APPENDIX II

SPRUCE RIVER BELOW ANGLIN LAKE RESERVOIR

05GG007

Data not computed.

WATER SURVEY OF CANADA
MAY 13 1991 PAGE 1
REGINA, SASK. 11:19

ANGLIN LAKE RESERVOIR

STATION NO. 05GG005

(PRELIMINARY) DAILY MEAN WATER LEVELS IN METRES FOR 1990

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DAY
1	515.312	515.354	515.384	515.403	515.560	515.585	515.474	515.474	515.299	515.219	515.237	515.295	1
2	515.313	515.356	515.384	515.407	515.563	515.580	515.472	515.472	515.299	515.220	515.247	515.296	2
3	515.316	515.360	515.384	515.412	515.568	515.559	515.500	515.468	515.292	515.215	515.250	515.299	3
4	515.317	515.360	515.385	515.416	515.572	515.558	515.510	515.459	515.278	515.219	515.250	515.301	4
5	515.318	515.360	515.385	515.420	515.575	515.555	515.498	515.451	515.281	515.224	515.251	515.303	5
6	515.318	515.360	515.384	515.424	515.590	515.551	515.504	515.439	515.274	515.217	515.252	515.304	6
7	515.322	515.361	515.386	515.427	515.595	515.543	515.506	515.441	515.262	515.215	515.254	515.304	7
8	515.329	515.362	515.386	515.429	515.601	515.535	515.512	515.433	515.254	515.215	515.256	515.304	8
9	515.329	515.362	515.384	515.432	515.594	515.534	515.505	515.426	515.254	515.209	515.258	515.306	9
10	515.330	515.364	515.387	515.435	515.606	515.529	515.525	515.421	515.248	515.217	515.260	515.307	10
11	515.329	515.365	515.390	515.436	515.606	515.537	515.528	515.415	515.252	515.216	515.260	515.308	11
12	515.330	515.376	515.391	515.436	515.607	515.544	515.521	515.405	515.251	515.215	515.260	515.312	12
13	515.331	515.374	515.389	515.439	515.602	515.558	515.520	515.408	515.246	515.219	515.261	515.313	13
14	515.333	515.375	515.390	515.440	515.599	515.544	515.511	515.394	515.245	515.219	515.262	515.314	14
15	515.334	515.376	515.391	515.442	515.607	515.531	515.505	515.387	515.239	515.220	515.262	515.316	15
16	515.336	515.376	515.389	515.442	515.612	515.530	515.499	515.382	515.230	515.223	515.263	515.318	16
17	515.339	515.375	515.389	515.443	515.600	515.538	515.497	515.375	515.228	515.217	515.264	515.320	17
18	515.340	515.375	515.389	515.445	515.595	515.550	515.492	515.363	515.227	515.214	515.265	515.324	18
19	515.341	515.375	515.390	515.448	515.611	515.548	515.490	515.357	515.229	515.219	515.267	515.323	19
20	515.341	515.375	515.391	515.450	515.607	515.544	515.488	515.350	515.238	515.218	515.272	515.322	20
21	515.339	515.377	515.393	515.454	515.607	515.543	515.476	515.347	515.241	515.218	515.280	515.320	21
22	515.343	515.378	515.395	515.460	515.607	515.531	515.473	515.338	515.233	515.218	515.283	515.321	22
23	515.344	515.380	515.395	515.466	515.599	515.523	515.465	515.336	515.231	515.219	515.286	515.324	23
24	515.345	515.381	515.394	515.466	515.599	515.525	515.466	515.333	515.232	515.219	515.287	515.326	24
25	515.346	515.382	515.396	515.500	515.594	515.514	515.458	515.330	515.231	515.220	515.289	515.326	25
26	515.349	515.384	515.395	515.513	515.592	515.509	515.454	515.323	515.234	515.220	515.291	515.328	26
27	515.350	515.382	515.396	515.521	515.590	515.497	515.488	515.314	515.230	515.220	515.291	515.330	27
28	515.353	515.382	515.396	515.534	515.586	515.490	515.502	515.307	515.228	515.219	515.292	515.330	28
29	515.357		515.397	515.556	515.578	515.489	515.489	515.301	515.215	515.216	515.292	515.329	29
30	515.354		515.398	515.559	515.568	515.479	515.477	515.300	515.221	515.220	515.294	515.328	30
31	515.354		515.400		515.569		515.473	515.306	515.225		515.329	515.329	31
TOTAL	15975.396	14430.387	15977.103	15463.675	15983.359	15466.053	15980.278	15976.856	15457.432	15971.700	15458.036	15974.780	TOTAL
MEAN	515.335	515.371	515.390	515.456	515.592	515.535	515.493	515.382	515.248	515.218	515.268	515.315	MEAN
MAX	515.357	515.384	515.400	515.559	515.612	515.565	515.528	515.474	515.299	515.225	515.294	515.330	MAX
MIN	515.312	515.354	515.384	515.403	515.560	515.479	515.454	515.300	515.215	515.209	515.237	515.295	MIN

SUMMARY FOR THE YEAR 1990

MAXIMUM DAILY WATER LEVEL 515.612 METRES ON MAY 16

MINIMUM DAILY WATER LEVEL 515.209 METRES ON OCT 9

MAXIMUM INSTANTANEOUS WATER LEVEL, 515.620 METRES AT 1340 CST ON MAY 16.

WATER LEVELS ARE REFERRED TO GEODETTIC SURVEY OF CANADA DATUM

WATER SURVEY OF CANADA
MAY 13 1991 PAGE 1
REGINA, SASK. 13:13

SPRUCE RIVER DIVERSION TO EPPA LAKE

STATION NO. 0500006

(PRELIMINARY) DAILY DISCHARGE IN CUBIC METRES PER SECOND FOR 1990

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DAY
1			0	0	0	0.522	0.483	0.543	0.594	0			1
2			0	0	0	0.523	0.485	0.544	0.592	0			2
3			0	0	0.237	0.526	0.487	0.543	0.590	0			3
4			0	0	0.493	0.524	0.490	0.547	0.592	0			4
5			0	0	0.488	0.524	0.486	0.546	0.596	0			5
6			0	0	0.485	0.522	0.479	0.548	0.588	0			6
7			0	0	0.482	0.526	0.473	0.555	0.579	0			7
8			0	0	0.476	0.526	0.473	0.565	0.577	0			8
9			0	0	0.471	0.530	0.471	0.560	0.573	0			9
10			0	0	0.471	0.515	0.466	0.574	0.270	0			10
11			0	0	0.470	0.518	0.459	0.580	0	0			11
12			0	0	0.474	0.523	0.456	0.582	0	0			12
13			0	0	0.483	0.527	0.459	0	0	0			13
14			0	0	0.490	0.526	0.455	0.580	0	0			14
15			0	0	0.501	0.517	0.463	0.581	0	0			15
16			0	0	0.506	0.519	0.465	0.587	0	0			16
17			0	0	0.504	0.522	0.469	0.584	0	0			17
18			0	0	0.507	0.526	0.469	0.595	0	0			18
19			0	0	0.516	0.529	0.476	0.596	0	0			19
20			0	0	0.527	0.528	0.469	0.594	0	0			20
21			0	0	0.522	0.525	0.473	0.593	0	0			21
22			0	0	0.528	0.507	0.482	0.592	0	0			22
23			0	0	0.535	0.498	0.481	0.592	0	0			23
24			0	0	0.532	0.510	0.486	0.598	0	0			24
25			0	0	0.535	0.502	0.490	0.598	0	0			25
26			0	0	0.533	0.500	0.505	0.595	0	0			26
27			0	0	0.533	0.500	0.530	0.592	0	0			27
28			0	0	0.535	0.486	0.540	0.594	0	0			28
29			0	0	0.524	0.487	0.543	0.596	0	0			29
30			0	0	0.518	0.479	0.544	0.595	0	0			30
31			0	0	0.520		0.545	0.597		0			31
TOTAL			0	0	14.396	15.467	15.052	17.755	5.551	0			TOTAL
MEAN			0	0	0.464	0.516	0.486	0.573	0.185	0			MEAN
DAM3			0	0	1240	1340	1300	1530	480	0			DAM3
MAX			0	0	0.535	0.530	0.545	0.598	0.596	0			MAX
MIN			0	0	0	0.479	0.455	0.385	0	0			MIN

SUMMARY FOR THE MONTHS MAR TO OCT

MEAN DISCHARGE, 0.278 M³/S
TOTAL DISCHARGE, 5890 DAM3
MAXIMUM DAILY DISCHARGE, 0.598 M³/S ON AUG 24
MINIMUM DAILY DISCHARGE, 0 M³/S ON MAR 1

(PRELIMINARY) DAILY MEAN WATER LEVELS IN METRES FOR 1990

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DAY
1							515.416	515.500	515.442	515.385			1
2							515.424	515.507	515.443	515.384			2
3							515.455	515.499	515.440	515.382			3
4							515.460	515.500	515.440	515.376			4
5							515.457	515.494	515.434	515.378			5
6					515.434		515.455	515.495	515.439	515.371			6
7							515.458	515.489	515.432	515.356			7
8					515.375		515.460	515.480	515.432	515.350			8
9							515.460	515.478	515.430	515.346			9
10							515.466	515.482	515.427	515.345			10
11					515.402		515.481	515.480	515.421	515.354			11
12							515.480	515.477	515.418	515.344			12
13					515.440		515.478	515.478	515.418	515.354			13
14							515.478	515.471	515.417	515.354			14
15							515.479	515.464	515.415	515.352			15
16					515.414		515.471	515.469	515.409	515.348			16
17							515.475	515.472	515.406				17
18							515.473	515.456	515.401				18
19							515.471	515.458	515.399				19
20					515.441		515.473	515.455	515.406	515.370			20
21							515.463	515.455	515.398				21
22							515.463	515.451	515.395				22
23							515.463	515.455	515.396				23
24					515.416		515.463	515.446	515.395				24
25							515.467	515.444	515.394				25
26							515.461	515.440	515.393				26
27						515.410	515.511	515.442					27
28						515.417	515.523	515.441					28
29						515.415	515.503	515.440					29
30					515.411	515.415	515.503	515.444					30
31							515.502	515.446		515.326			31
TOTAL							15979.592	15979.508					TOTAL
MEAN							515.471	515.468					MEAN
MAX							515.523	515.507					MAX
MIN							515.416	515.440					MIN

SUMMARY FOR THE YEAR 1990

MAXIMUM DAILY WATER LEVEL 515.523 METRES ON JUL 28

MINIMUM DAILY WATER LEVEL 515.326 METRES ON OCT 31

WATER LEVELS ARE REFERRED TO GEODETIC SURVEY OF CANADA DATUM

CHRISTOPHER LAKE NEAR CHRISTOPHER LAKE

STATION NO. 05GG009

(PRELIMINARY) DAILY MEAN WATER LEVELS IN METRES FOR 1990

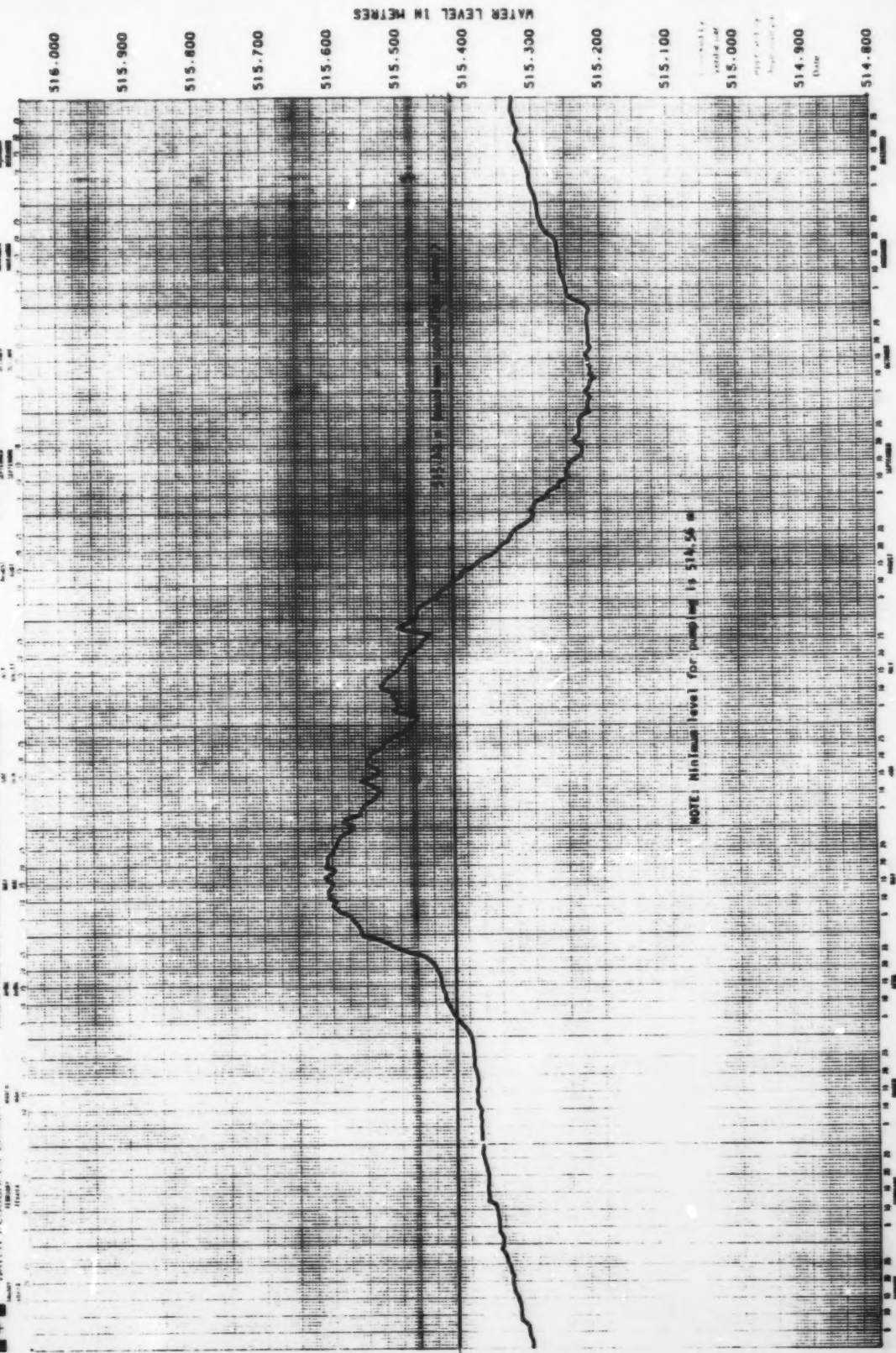
DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DAY
1													1
2								514.688			514.501		2
3								514.697					3
4													4
5							514.693		514.584	514.535			5
6						514.593							6
7													7
8								514.663					8
9													9
10													10
11					514.608		514.715		514.564	514.481			11
12													12
13					514.629								13
14													14
15							514.647						15
16					514.602								16
17										514.516			17
18							514.683		514.548				18
19													19
20					514.643						514.519		20
21													21
22								514.622					22
23									514.506				23
24					514.604								24
25							514.681		514.544				25
26													26
27													27
28						514.659							28
29								514.600					29
30					514.590								30
31													31
TOTAL													TOTAL
MEAN													MEAN
MAX													MAX
MIN													MIN

SUMMARY FOR THE YEAR 1990

MAXIMUM DAILY WATER LEVEL 514.715 METRES ON JUL 11

MINIMUM DAILY WATER LEVEL 514.481 METRES ON OCT 11

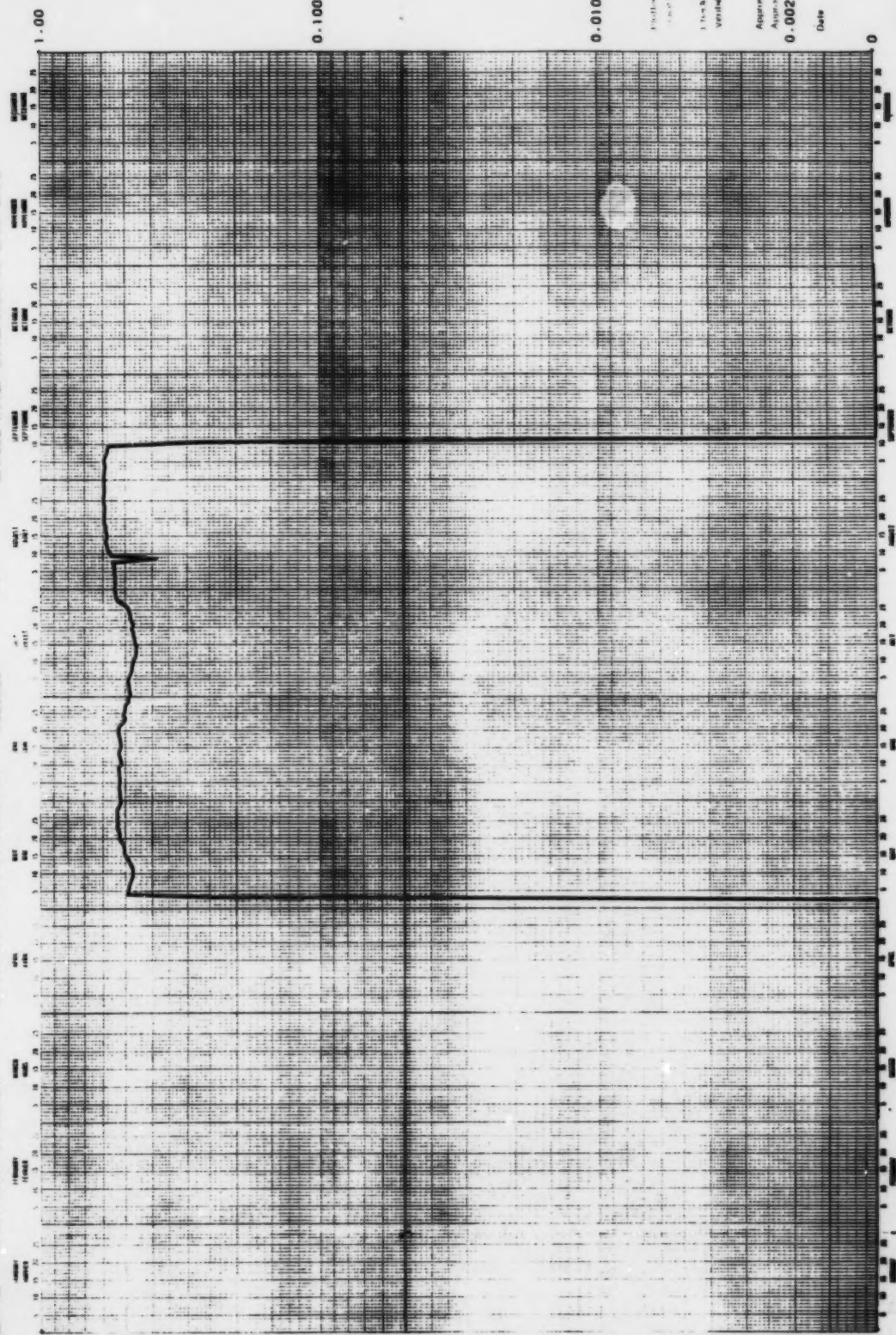
WATER LEVELS ARE REFERRED TO GEODETIC SURVEY OF CANADA DATUM



05G0006

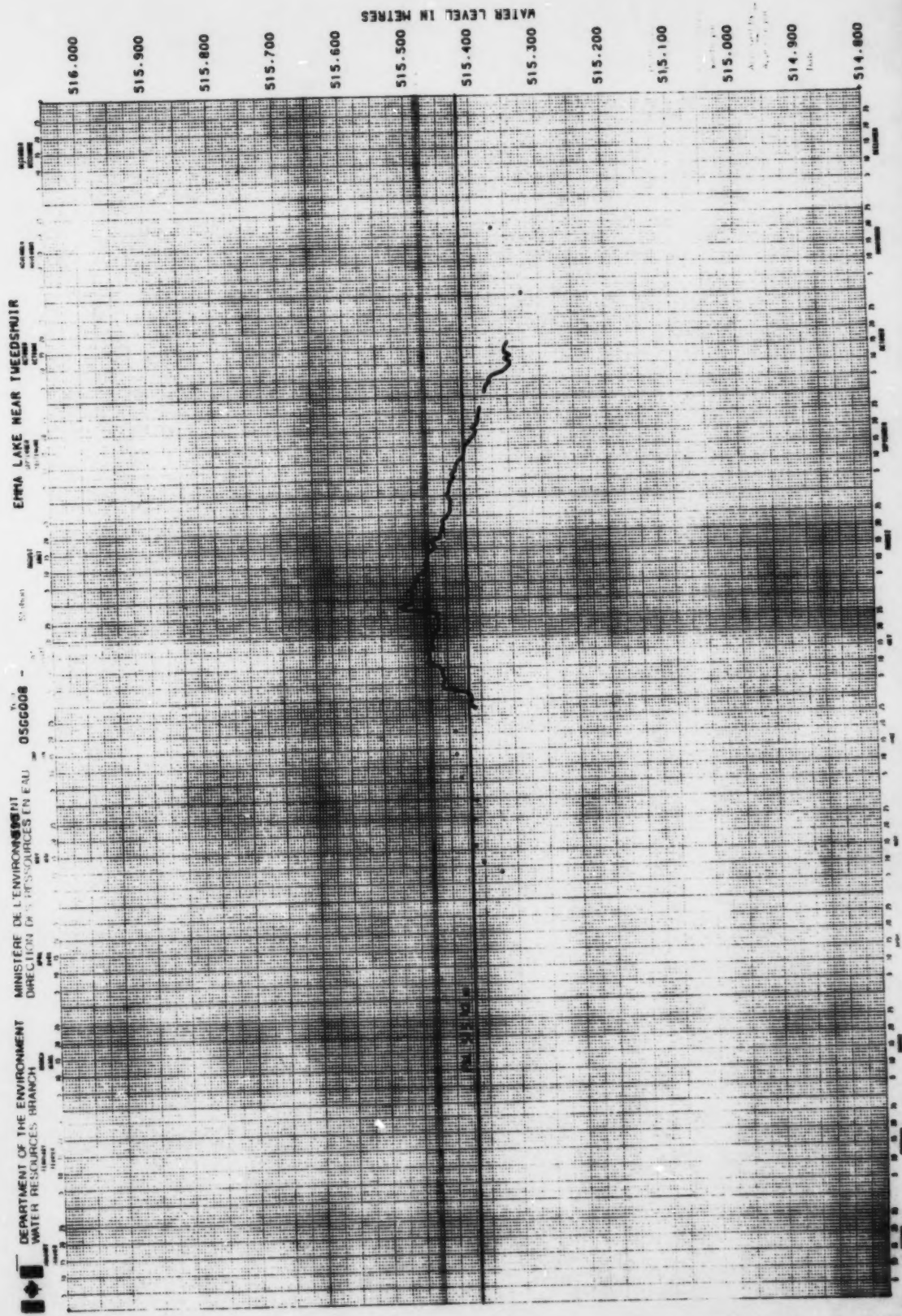
30 Jan

SPRUCE RIVER DIVERSION TO ENNA LAKE



DISCHARGE IN M3/S

Checked by _____
 Drawn by _____
 1 in. high by _____
 Verified by _____
 Approved by _____
 Approved by _____
 0.002
 Date _____

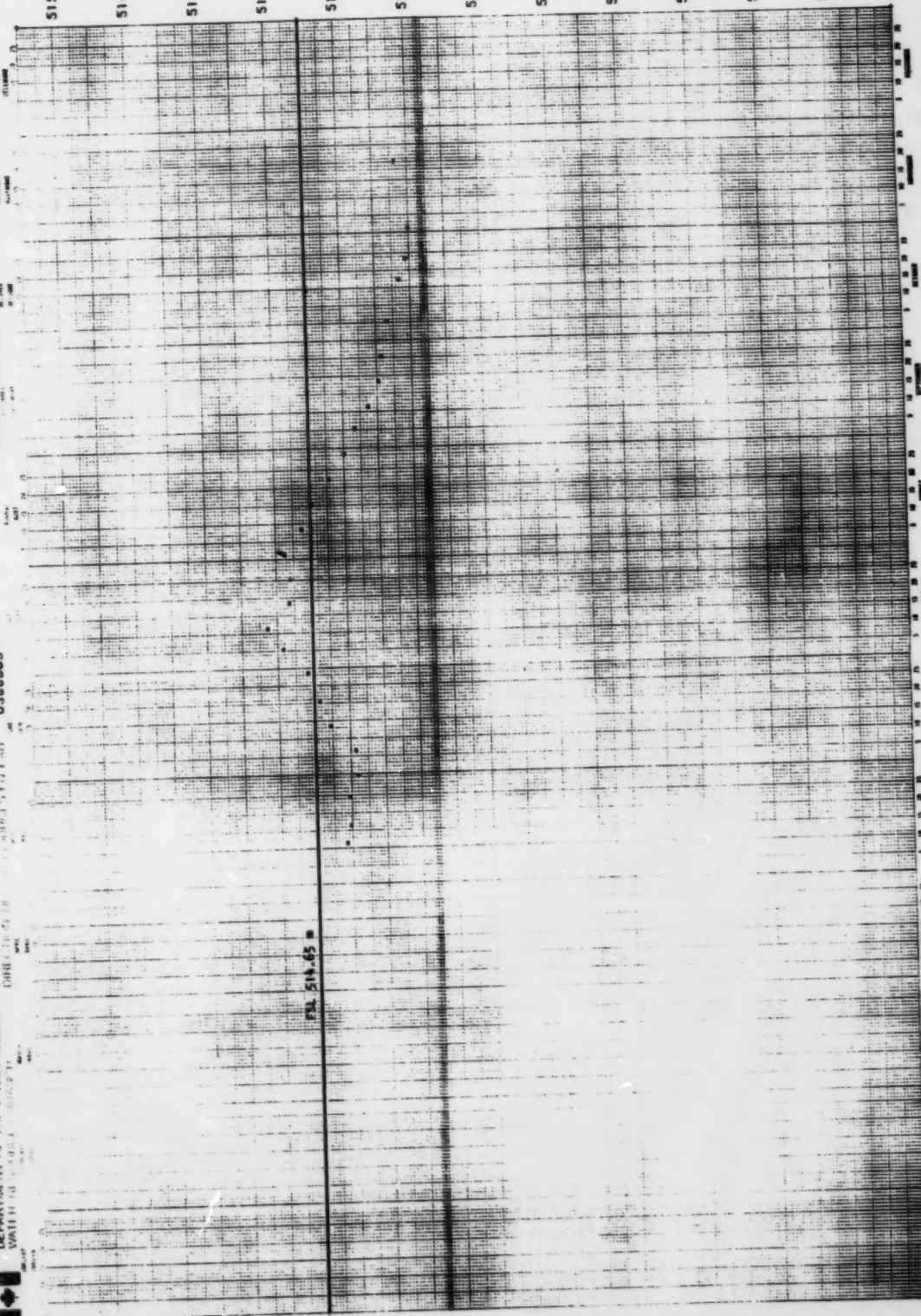


CHRISTOPHER LAKE NEAR CHRISTOPHER LAKE

OSCC009 -

MINISTER OF ENVIRONMENT
DIRECTOR OF WATER RESOURCES

DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES DIVISION



WATER LEVEL IN METRES

515.000
514.900
514.800
514.700
514.600
514.500
514.400
514.300
514.200
514.100
514.000
513.900
513.800